What is claimed is:

1. A device for controlling a fuel cell system comprising a fuel cell stack to which hydrogen and air containing oxygen are supplied through hydrogen supply conduit and air supply conduit, the device comprising:

   a microprocessor;

   a voltage detection circuit for detection of an output voltage of the fuel cell stack and applying a first detection signal associated with the voltage detection to the microprocessor;

   a current detection circuit for detection of an output current of the fuel cell stack and applying a second detection signal associated with the current detection to the microprocessor;

   a hydrogen pressure detection circuit comprising pressure gauging means for detection of hydrogen pressure inside the hydrogen supply conduit and applying a third detection signal associated with the hydrogen pressure detection to the microprocessor;

   a temperature detection circuit comprising temperature gauging means for detection of temperature associated with the fuel cell stack and applying a fourth detection signal associated with the temperature detection to the microprocessor;

   an air flow control circuit controlled by the microprocessor to induce an air flow rate in the air supply conduit in accordance with the output current of the fuel cell stack;

   a pulse generation circuit controlled by the microprocessor to generate and apply pulse signal to a hydrogen valve mounted to the hydrogen supply conduit for controlling hydrogen flow rate through the hydrogen supply

conduit by selectively opening/closing the hydrogen valve;

a storage unit coupled to the microprocessor for storage of reference values of operation parameters of the fuel cell system; and

a setting unit coupled to the microprocessor for selectively establishing a control process and the reference parameters based on which the microprocessor controls the operation of the fuel cell system.

2. The device as claimed in Claim 1, wherein the output voltage of the fuel cell stack is in analog form and wherein the voltage detection circuit comprises an analog-to-digital converter for converting the analog signal into the first detection signal in digital form that is applied to the microprocessor.

3. The device as claimed in Claim 1, wherein the output current of the fuel cell stack is in analog form and wherein the current detection circuit comprises an analog-to-digital converter for converting the analog signal into the second detection signal in digital form that is applied to the microprocessor.

4. The device as claimed in Claim 1, wherein the pressure gauging means of the hydrogen pressure detection circuit comprising:

a first pressure gauge mounted to a high pressure side of the hydrogen supply conduit for detection of upstream pressure of hydrogen that is discharged from a fuel supply device, the first pressure of hydrogen being converted from an analog form into a digital form that is applied to the microprocessor; and

a second pressure gauge mounted to a low pressure side of the hydrogen supply conduit for detection of downstream side pressure of hydrogen that is guided to the fuel cell stack, the second pressure of hydrogen being converted from an analog form into a digital form that is applied to the microprocessor

5. The device as claimed in Claim 1, wherein the air flow control circuit comprises a pulse width modulation circuit for generation of a pulse width modulation signal to control an air pumping device that induces the air flow rate in the air supply conduit.

6. A method for controlling a fuel cell system comprising a fuel cell stack, the method comprising the following steps:

   (1) initiating a star-up routing to start supply of air and hydrogen to the fuel cell stack through air supply conduit and hydrogen supply conduit respectively;

   (2) detecting hydrogen pressure inside the hydrogen supply conduit;

   (3) based on the detected hydrogen pressure, selectively opening/closing a hydrogen valve mounted to the hydrogen supply conduit for controlling hydrogen flow rate through the hydrogen supply conduit;

   (4) detecting output voltage and current of the fuel cell stack; and

   (5) based on the detected current, selectively driving an air pumping device mounted to the air supply conduit, in a pulse width modulated manner, for controlling air flow rate through the air supply conduit.

7. The method as claimed in Claim 6, wherein the start-up routing comprises the following steps:

   (a) opening the hydrogen valve to cause the hydrogen flow to the fuel cell stack;

   (b) actuating the air pumping device to supply a maximum flow rate of air to the fuel cell stack for a given period of time; and

(c) controlling the air pumping device to supply air in a minimum air flow rate to the fuel cell stack.

8. The method as claimed in Claim 7 further comprising a step for opening the hydrogen valve for a given period of time in order to expel impure gases out of the fuel cell stack and the hydrogen supply conduit.

9. The method as claimed in Claim 6 further comprising a step of controlling temperature of the fuel cell stack within a preset range.

10. The method as claimed in Claim 6, wherein the opening/closing operation of the hydrogen valve is done with a pulse signal.

11. The method as claimed in Claim 6, wherein the control of air flow rate comprises:

(a) setting the air flow rate to a minimum level when an output current of the fuel cell stack is smaller than a lower limit;

(b) setting the air flow rate to three times of a required level in accordance with the output current when the output current is greater than the lower limit but smaller than an upper limit; and

(c) setting the air flow rate to a maximum level when the output current is greater than the upper limit.

12. The method as claimed in Claim 6, wherein the step of driving the air pumping device comprises controlling the air pumping device in accordance with the output voltage of the fuel cell stack whereby when the output voltage is lower than a preset lower bound, the air pumping device is caused to provide air flow with a maximum air flow rate for a given period of time and then resumes a regular flow rate and at the same time, the hydrogen exhaust

valve is opened for a given period of time and then shut down.

13. The method as claimed in Claim 12 further comprising shutting down the fuel cell system when the output voltage of the fuel cell stack is below a preset safety threshold of output voltage.